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MEMORANDUM

TO: Ritchie Graves, NOAA

FROM: Michele DeHart

DATE: November 30, 2012

RE: Response to NOAA comments on Draft 2012 Comparative Survival Study Annual Report

Attached is the CSS Oversight Committee response to NOAA comments on the Draft 2012 Comparative Survival Study Annual Report. We have responded to each comment in the attached document. The original NOAA comment is followed by the response in italic font. We appreciate the time that NOAA invested in reviewing the draft report and providing helpful constructive comments.

NMFS Hydropower Division Technical Comments on the Draft CSS 2012 Report

October 15, 2012

1. We have concerns that without looking at the seasonal effects of transportation, a primary objective of this study is not being achieved, – the effectiveness of transportation as a management tool. The delayed start date of transportation for the spring-migrating fish (based on an acknowledgement that inriver migrants tend to return at higher rates than transported fish early in the season) makes the TIR as currently reported (a seasonal average) a less relevant comparison of transportation to in-river migrants. This is due to the fact that fish are transported for just part of the season, yet they are compared to an in-river group that has migrated over a longer time frame (the entire spring season). We do not object to presenting the seasonal average as it provides a linkage to past years' data. However, this metric is currently of little value in making an assessment of whether transport was effective over the time-frame it was used. Thus, we recommend that the report also include a TIR estimate which directly compares the returns of the inriver and transported groups when transport is being implemented.

   Response: *The primary and initial objective of the CSS was to evaluate route of passage and SAR based upon comparisons of transportation route of passage and the C_0 route of passage. A key objective of this study is to evaluate transportation on the basis of all routes of passage including the C_0 route of passage. The C_0 undetected passage which was not previously evaluated by NOAA Fisheries in previous evaluations of transportation only compared transported fish with fish migrating through the juvenile bypass system. Temporal evaluation of transportation cannot take place because the time of passage of the C_0 group is unknown. Recent analyses indicate that delayed mortality is associated with power house passage, which would create a downward bias in results when transportation evaluations are based upon comparison of the transported fish with the powerhouse bypassed fish. Evaluation of bypass compared to transported fish as would be required in temporal estimates of transportation benefits, overstates the benefit of transportation.*

2. The rationale for reporting SAR values of Upper Columbia groups based on MCN to BON was not clear. Reporting returns to Bonneville is informative, but Page 46 makes the statement that, "Due to limited detection capability upstream of MCN, most SAR data series are presented MCN-to-BON". Nearly 100% adult detection capability exists at four projects upstream of McNary Dam: Priest Rapids, Rock Island, Rocky Reach, and Wells dams . We suggest also reporting SARs to Rock Island Dam, the lowermost dam

above which nearly the entire Upper Columbia River ESUs must pass, as a means of adhering to the report's convention of reporting SARs to the uppermost dam.

Response: *We have modified a sentence on page 46 to clarify that the limitation to estimating SARs for Upper Columbia groups is due to lack of detection capability for juvenile out-migrants upstream of McNary Dam: "Due to limited detection capability of juvenile out-migrants upstream of MCN, most SAR data series are presented as MCN-to-BOA." Note also that the CSS will continue to work on this issue using smolt abundance estimates at RRE, as well as using FPC Smolt Monitoring Program tagging at Rock Island Dam for combined hatchery/wild groups of yearling Chinook, subyearling Chinook, and steelhead (see figures 4.11 and 4.12, and tables 4.33, and 4.36-4.39). For purposes of regional monitoring, the CSS estimates overall SARs for adults at BON for both Snake River and the other regional PIT-tag groups. We also plan to estimate SARs and confidence intervals to the uppermost dams with adult detection facilities in future reports.*

3. Mid-Columbia River SARs are reported only as JDA-to-BOA. While this is helpful, it would also be informative to have an estimate of the JDA-to-JDA SARs. The absence of an adult PIT tag detector at JDA makes this somewhat challenging. However, a loss per mile estimate could be applied to the adults, similar to how the report uses juvenile survival estimates based on a survival per mile estimate. Since adult survival is reduced by both harvest and hydro effects as they migrate through the river, applying such a loss estimate for adults would better represent the reports convention of "Reporting SARs to the upmost dam". Using adult detections in the John Day River plus those of any overshoots (especially for steelhead) detected at McNary dam, should provide sufficient information to generate a JDA to JDA SAR estimate.

Response: *As noted in the comment, no adult PIT tag detection capability exists at John Day Dam, thus no adult PIT tag data are available at John Day Dam. For purposes of regional monitoring, the CSS estimates overall SARs for adults at BON for both Snake River and the other regional PIT tag groups. Complete PIT tag detection capability at BON for adults has been available since the 2002 adult return. Note the CSS convention for Chapter 4 is not simply "*Reporting SARs to the upmost dam*" - SARs for all populations are reported at the first uppermost mainstem PIT tag detection site encountered by juvenile out-migrants to adults ascending the Bonneville Dam adult fish ways. We also plan to estimate SARs and confidence intervals to the uppermost dams with detection facilities in future reports. For the overall SARs presented in Chapter 4, the CSS does not use "*a loss per mile estimate … similar to how the report uses juvenile survival estimates…" *and it does not plan to use other than actual adult detections to*

estimate overall SARs. Information to generate a JDA to JDA SAR estimate for steelhead is insufficient, because the detection probability in the John Day River is unknown and detection capability for "any overshoots" that swim back downstream through McNary Dam is insufficient.

4. It appears that S.oa (Tables 4.40 and 4.41) are being calculated as SAR (lgr to lgr) / System Survival. Unfortunately, when System Survival > 1.00 (due primarily to D estimates > 1.00) this estimate is illogical. We suggest that when D (and System Survival) are > 1.00; the relative survival of the inriver migrants should be discounted, instead of a benefit accruing to transported fish. This will ensure that system survival estimates < 1.00 (which is logical) and that S.oa estimates are NOT unduly influenced by expectations that transported fish doubled in a number in years like 2001 (and 2002 and 2004 for wild steelhead).

   Response: *The methods of calculating S.oa and S.o1 are consistent with past literature cited in Chapter 4. We added language to clarify this point. The estimates of system survival put the effects of transportation (as estimated by D) on the transported group into in-river equivalents upon estuary entry. Both S.oa and S.o1 represent marine survival of in-river migrants. Transported smolts are expressed as in-river equivalents by adjusting their Bonneville arrival numbers by the estimate of D (Petrosky and Schaller 2010). Although this differential delayed mortality of transported fish is mostly expressed during the early marine stage, we apply it to the downstream migration stage (system survival), because it simplifies calculation of the early ocean survival rate and is consistent with earlier analyses. S.oa is calculated as the survival rate of in-river migrants below Bonneville Dam to adult return (including jacks) to both Lower Granite Dam and the Columbia River mouth. S.o1 is back-calculated from the age structured recruits to the Columbia River mouth, assuming 80% annual survival of sub-adults. This is consistent with other cohort –based Chinook modeling studies (e.g., Pacific Salmon Commission 1998), and assigns all ocean survival rate variability to the S.o1 life-stage (Zabel et al. 2006; Petrosky and Schaller 2010).*

5. Comments on Chapter 5, which reports on fall Chinook.

- The estimation procedure to select which release groups fit the CJS model seemed overly complicated and given it is a work in progress, its presentation might best be placed in an appendix. However, given the influence of hold-overs on results and the fact they don't fit the CJS model assumptions it raises the question whether the CJS model is the best way to analyze this data? Some sensitivity analysis (what if the number of hold overs was 2X, 5X, etc. the estimates) on what effect this would have on

the CJS estimates would better illustrate the point and convince the reader that the CJS results are reasonable.

Response: *The detail provided was necessary in-order to follow-up on the analytical approach that was under development in the 2010 report. It was important to come to some resolution on the method which was introduced as a possible way to separate fish with high holdover probability. The fact that it did not work was why results of the analysis were abbreviated in the report.*
The simulations done in the later sections of the Chapter did provide some sensitivity analysis including a range of possible effects on SAR estimates. The groups we used in the SAR analysis were groups of fish with very few to no holdovers present such that SARs were virtually unaffected. Those groups with high holdover proportions such as wild Clearwater marks and surrogates were not used because of the potential impact on SAR estimation.

- It was our understanding this "consensus study" was supposed to include a collaborative analytical effort involving the authors of this report as well as NMFS, the Corps, and other stakeholders to avoid "dueling analyses and reporting". Has the original plan of a broad collaborative effort changed? An update on the status of the consensus analytical effort would be helpful.

  Response: *The Fall Chinook analyses are included in the CSS Annual Report in response to a request from the Oregon Department of Fish and Wildlife. The CSS analyses are provided to the Fall Chinook Planning Team for their review and consideration. The CSS analyses and Annual Report are the result of the collaborative effort of Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, the US Fish and Wildlife Service and the Columbia River Inter-tribal Fish Commission. Representation on the CSS Oversight Committee overlaps representation on the Fall Chinook Planning team. The CSS analyses do not supplant the Fall Chinook planning team but rather provides technical input to the Fall Chinook Planning Team. The scientific process is strengthened by multiple analytical approaches and reporting of those approaches. The scientific process breaks down when only one view, one analytical approach, one method are allowed to go forward. The Fall Chinook Planning team efforts can only be strengthened by the consideration and inclusion of CSS analyses.*

- The conclusion made on page 115 that "The pattern of little or no transport benefit [for fall Chinook] appears to be holding", does not appear to be supported by the data

presented in the report. The TIRs in Table 5.16 were all positive, with two groups showing significantly higher TIRs. We suggest that a more reasonable conclusion is that transport benefits are not consistent between groups or years and that returns from 2010 and subsequent outmigrations will be informative because the dam configuration improvements to benefit inriver migrants were largely completed by then.

Response: *We have modified the concluding bullet to read "By study group, SARs were also quite low and based on TIRs there appears to be no benefit to transport evident in the 2006 returns. Returns for more recent years are not complete but there appeared to be a significant benefit for some transport groups 2008 while in 2009 the pattern of little or no transport benefit appears similar to 2006."*

- The fall Chinook SAR data is presented as a seasonal average. It would be informative to determine whether the effect of transportation varies through the season. Are there sufficient numbers of adult returns to estimate SARs for more than one period in some years?

Response: *There is no way to calculate SARs through the season using the CSS methodology. CSS method does not use C1 fish to calculate in-river SARs for comparison to transport (e.g. TIR) since it has been shown that bypassing fish can lead to delayed mortality and decreased adult returns.*

Lastly, the report concludes on page 115 that "Overall Smolt-to-adult return rates for Snake River subyearling fall Chinook were very low in the years we have analyzed." We assume that you mean relative to the Council's 2-6% SAR target or to Snake River spring/summer Chinook or steelhead SARs. However, SARs of subyearling migrants are <u>expected</u> to be lower than those for larger yearling migrants. We urge you to also compare S.R. fall Chinook SARs to those of other subyearling migrants from other interior bright fall Chinook ESUs (unlisted Deschutes River or Upper Columbia River fall Chinook) as a more meaningful comparison.

Response: *We agree that the reference to the Council's 2 to 6% target are not appropriate for fall Chinook and have removed reference to those. We also agree that estimation of SARs for Deschutes River and Upper Columbia River fall Chinook would be useful and we will explore the possibility of providing SARs for other fall Chinook groups in future CSS reports.*

References from Responses to ISAB and NOAA:

Haeseker, S.L., J.M. McCann, J.E. Tuomikoski, and B. Chockley. 2012. Assessing freshwater and marine environmental influences on life-stage-specific survival rates of Snake River spring/summer Chinook salmon and steelhead. Transactions of the American Fisheries Society, 141:1, 121-138.

Marmorek, D.R., M. Porter, I.J. Parnell and C. Peters, eds. 2004. Comparative Survival Study Workshop, February 11–13, 2004; Bonneville Hot Springs Resort. Draft Report compiled and edited by ESSA Technologies Ltd., Vancouver, B.C. for Fish Passage Center, Portland, OR and the US Fish and Wildlife Service, Vancouver, WA. 137 pp.

Marmorek, D., Hall, A., and M. Porter 2011. Comparative Survival Study (CSS) Workshop Report. Prepared by ESSA Technologies Ltd., Vancouver, B.C. for the Fish Passage Center (Portland OR) and U.S. Fish and Wildlife Service (Vancouver WA), 147 pp.

Pacific Fishery Management Council. 2012. Pacific Coast Salmon Fishery Management Plan for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California as Revised Through Amendment 16. PFMC, Portland, OR. 90 p.

Petrosky, C.E., H.A. Schaller, and P. Budy. 2001. Productivity and survival rate trends in the freshwater spawning and rearing stage of Snake River chinook salmon (*Oncorhynchus tshawytscha*). Canadian Journal of Fisheries and Aquatic Sciences 58:1196-1207.

Petrosky, C.E., and H.A. Schaller. 2010. Influence of river conditions during seaward migration and ocean conditions on survival rates of Snake River Chinook salmon and steelhead. Ecology of Freshwater Fish 19(4): 520-536.

Raymond, H.L. 1988. Effects of hydroelectric development and fisheries enhancement on spring and summer Chinook salmon and steelhead in the Columbia River Basin. North American Journal of Fisheries Management 8:1-24.